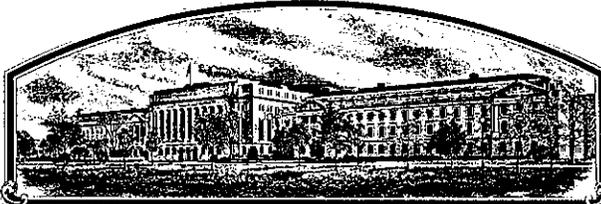


No.



8700202

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen\** YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT.

THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS TO THE NUMBER OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS PROVIDED BY THE OWNER OF THE RIGHTS. (34 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'2180'

AMENDED CERTIFICATE

\*Original grant January 31, 1989.

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D. C.

this 29th day of March in the year of our Lord one thousand nine hundred and ninety-one.

Attest:

*Kenneth Evans*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*Ed Madigan*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

**APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE**

(Instructions on reverse)

1. NAME OF APPLICANT(S) <b>KANSAS AGRICULTURAL PIONEER HI-BRED INTERNATIONAL, INC.</b> Plant Breeding Division <b>EXPERIMENT STATION</b> Dept. of Cereal Seed Breeding		2. TEMPORARY DESIGNATION  XW161	3. VARIETY NAME  2180
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) 1000 W. Jefferson Street <b>WATERS HALL</b> Tipton, Indiana 46072 <b>KANSAS STATE UNIVERSITY</b> <b>MANHATTAN, KS 66506-4008</b>		5. PHONE (Include area code) (913) 532-6147 (317) 675-2101	
6. GENUS AND SPECIES NAME  Triticum aestivum		7. FAMILY NAME (Botanical)  graminae	
8. KIND NAME  Wheat		9. DATE OF DETERMINATION  August 1, 1985	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)  Corporation		12. DATE OF INCORPORATION  May 1926	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION  Iowa		12. DATE OF INCORPORATION  May 1926	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS <del>Dr. Mark M. Iwig</del> <del>1000 W. Jefferson Street</del> <del>Tipton, Indiana 46072</del> <del>JOHNSTON, IA 50131-0085</del> <b>VERNON A. SCHAFFER</b> <b>DEPARTMENT OF AGRONOMY</b> <b>THROCKMORTON HALL</b> <b>KANSAS STATE UNIVERSITY</b> <b>MANHATTAN, KS</b> PHONE (Include area code): (913) 532-6115 (516) 270-3300 (317) 675-2101 ext. 2302			
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED			
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)			
b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement.			
c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.)			
d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety.			
e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership.			
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.)			
<input checked="" type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input checked="" type="checkbox"/> No			
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input checked="" type="checkbox"/> Foundation <input checked="" type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified	
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?			
<input type="checkbox"/> Yes (If "Yes," give date)			
<input checked="" type="checkbox"/> No			
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?			
<input type="checkbox"/> Yes (If "Yes," give names of countries and dates)			
<input checked="" type="checkbox"/> No			
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT <b>Mark M. Iwig</b>		DATE <b>9/11/87</b>	
SIGNATURE OF APPLICANT		DATE	

## 14A. Exhibit A. Origin and Breeding History of the Variety

2180, Triticum aestivum L. em Thell, a hard red winter wheat, was developed by Pioneer Hi-Bred International, Inc. from the cross TAM W-101/W603//W558. W603 is an F3-derived selection from the cross Etoile de Choisy//Thorne/Clarkan/3/CI15342/4/Purdue 4946A4-18-2. W558 is an F2-derived selection from the backcross of an unknown soft red winter wheat recurrent parent and a CIMMYT selection.

The F1 generation was grown in the field at Hutchinson, KS in 1976. In 1978, the F2 population was grown near Hastings, Nebraska and bulk-harvested. In 1979, F3 single heads were selected from the bulk, at Hutchinson, Kansas, and grown in 1980 as individual rows near Hasting, Nebraska. The resulting F4 row was bulk harvested and in 1981 was grown again at Hutchinson. Single heads were selected from the 1981 bulk and planted as individual rows in 1982. One F5-derived row was selected in 1982 and the bulked seed from this row was planted as a progeny plot in 1983 at both Hutchinson, Kansas and Altus, Oklahoma. 2180 has been in yield tests and milling and baking trials since 1983.

'2180' HAS SHOWN UNIFORMITY AND STABILITY FOR ALL TRAITS AS DESCRIBED IN EXHIBIT C (FORM LMBS 470-6, REVISED 6-82), TITLED "OBJECTIVE DESCRIPTION OF VARIETY."

EX as per letter dated 10/20/88

## 14B. Exhibit B. Novelty Statement

2180 is an awned semidwarf hard red winter wheat cultivar, **MOST** similar to the variety Pioneer brand 2172 in many phenotypic and agronomic traits. From the "Objective Description" it will be noted that 2180 is uniquely different from 2172 in juvenile plant growth habit (semi-erect vs. erect for 2172), plant color at booting (yellow-green for 2180 vs. bluegreen for 2172), hairiness of last internode of stem rachis (absent vs. present for 2172), glume length (short vs. medium for 2172), glume width (narrow vs. medium for 2172), and glume shoulder shape (square vs. elevated for 2172).

Referring to 14D. Exhibit F, 2180 has superior juvenile vigor to 2172, heads 2 days earlier, has stronger straw and better stripe rust resistance, while 2172 is more resistant to stem rust.

In 3 years of testing at Kansas State University for the Hessian fly resistance gene H3, 2180 has been uniformly resistant, while 2172 has been heterogeneous (i.e. has 20-30% susceptible plants).

2180  
Pioneer  
2172  
10/19/45



## 11. HEAD:

2 Density: 1 = LAX 2 = DENSE  4 Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE  
4 = OTHER (Specify) Fusiform

4 Awedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

1 Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED  
5 = BROWN 6 = BLACK 7 = OTHER (Specify): \_\_\_\_\_

1 0 CM. LENGTH  0 8 MM. WIDTH

## 12. GLUMES AT MATURITY:

1 Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.)  
3 = LONG (CA. 9 mm.)  1 Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.)  
3 = WIDE (CA. 4 mm.)

4 Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED  
4 = SQUARE 5 = ELEVATED 6 = APICULATE  3 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

## 13. COLEOPTILE COLOR:

3 1 = WHITE 2 = RED 3 = PURPLE

## 14. SEEDLING ANTHOCYANIN:

1 1 = ABSENT 2 = PRESENT

## 15. JUVENILE PLANT GROWTH HABIT:

2 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

## 16. SEED:

3 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL  1 Cheek: 1 = ROUNDED 2 = ANGULAR

2 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG  1 Brush: 1 = NOT COLLARED 2 = COLLARED

3 Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN  
4 = BROWN 5 = BLACK

3 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) \_\_\_\_\_

0 7 MM. LENGTH  0 3 MM. WIDTH  3 3 GM. PER 1000 SEEDS

## 17. SEED CREASE:

1 Width: 1 = 60% OR LESS OF KERNEL 'WINOKA'  
2 = 80% OR LESS OF KERNEL 'CHRIS'  
3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

1 Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT'  
2 = 35% OR LESS OF KERNEL 'CHRIS'  
3 = 50% OR LESS OF KERNEL 'LEMHI'

## 18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

0 STEM RUST (Races)  2 LEAF RUST (Races)  0 STRIPE RUST (Races)  0 LOOSE SMUT

1 POWDERY MILDEW  0 BUNT  2 OTHER (Specify) Soil borne mosaic virus

## 19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

0 SAWFLY  0 APHID (Bydv.)  1 GREEN BUG  0 CEREAL LEAF BEETLE

OTHER (Specify) \_\_\_\_\_ HESSIAN FLY RACES:  2 GP  2 A  1 B  2 C  
 0 D  0 E  0 F  0 G

## 20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

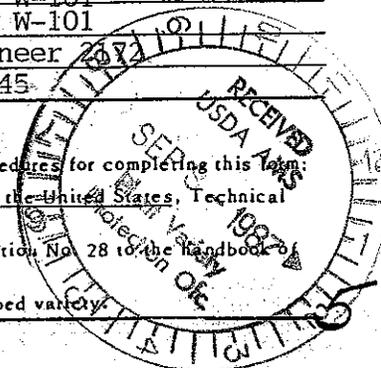
CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	TAM W-101	Seed size	TAM W-101
Leaf size	Pioneer 2172	Seed shape	TAM W-101
Leaf color	Pioneer 2165	Coleoptile elongation	Pioneer 2172
Leaf carriage	Pioneer 2172	Seedling pigmentation	PL145

## INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

- (a) L.W. Briggie and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.
- (b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the Handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.



## 14D. Exhibit D. Additional Description of the Variety 2180

2180 is a common hard red winter wheat,  
Triticum aestivum L.

Flowering date of 2180 is 8 days earlier than the variety Scout and 2 days earlier than Pioneer 2172. The plant height of 2180 has averaged 95 cm, about 11 cm shorter than Newton and 1 cm shorter than Pioneer 2172.

The plant color of 2180 at booting stage is yellow-green.

Anther color of 2180 is yellow, similar to Pioneer 2157 and Newton.

Anthocyanin has been absent in the stem of 2180. A waxy bloom occurs on the stem. Internodes of XW161 are hollow. Normally, 4 stem nodes are present above ground. Internode length between flag leaf and leaf below is about 16 cm.

Auricles of 2180 are glabrous and lacking in anthocyanin.

Flag leaves are generally erect at booting and tend to be twisted. Hairs are present on the first leaf sheath. There is no waxy bloom on the flag leaf sheath. The first leaf below the flag leaf averages about 14 mm wide and 22 cm long when measured at Vernon, Texas.

Spikes are generally dense, fusiform, awned, and white at maturity. Awns are rough and about 3 to 6 cm in length. Spike width and length averages about ~~10~~<sup>8</sup> mm and ~~8~~<sup>10</sup> cm, respectively. However, spike width and length are variable with plant population and level of production.

The glumes of 2180 are narrow and short generally, having square shoulders. Beaks are acuminate.

When evaluated at Vernon, Texas, coleoptile color is purple and seedling anthocyanin is absent.

Juvenile plant growth habit of 2180 is semi-erect, similar to Pioneer 2165.

Kernels of 2180 are red in color, elliptical in shape, with rounded cheeks and a shallow crease. The brush is medium in size and is not collared. The embryo is medium in size. Kernels average 7 mm long and 3 mm wide and weigh about 33g per 1000. Phenol reaction is light brown.

2180 is moderately resistant to soil-borne mosaic virus and the predominant local races of leaf rust (Puccinia recondita f. sp. tritici), moderately susceptible to predominant local races of stem rust (P. graminis f. sp. tritici), and susceptible to powdery mildew (Erysiphe graminis f. sp. tritici). 2180 has not been tested for reaction to stripe rust, loose smut or bunt.

2180 is resistant to the Hessian fly races GP, A and C, but susceptible to race B. (These results suggest that 2180 carries the H3 gene for Hessian fly resistance.) 2180 is susceptible to greenbug biotype C and E, but has not been tested for resistance to sawfly or cereal leaf beetle.

2180 has a good yield record when compared with currently grown hard red winter wheats. A 4-year summary from Pioneer replicated yield tests is shown in Exhibit E.

2180 has agronomic traits suitable for the Hard Red Winter wheat production area of the Southern Great Plains of the United States. A 4-year summary from Pioneer replicated yield tests is shown in Exhibit F.

2180 has good hard wheat quality characteristics, similar to Pioneer 2157 for mixing time %, and tolerance, but lower than Pioneer 2157 for flour yield, flour protein and loaf volume. A 2-year summary is shown in Exhibit G.

8

## 14D. Exhibit E. Yield Performance of 2180

Compared with several HRW varieties in Pioneer yield plots during 1984-87 at various locations in the Southern Great Plains. (Not all the varieties were in all tests; therefore the no. of reps and LSD values indicate common tests for each with 2180, with yield adjustment of each variety based on 2180 being equal to 100%.)

<u>Variety</u>	<u>Yield</u> (bu/Acre)	<u>LSD(.05)</u>	<u>No. of</u> <u>Reps</u>
2180	53.5		---
Pioneer 2157	51.8	6.5	291
Pioneer 2172	54.2	5.9	275
TAM 105	46.8*	6.3	217
VONA	47.9	6.4	200

\* Significant at .05 level

## 14D. Exhibit F. Agronomic Traits of the Variety 2180

Compared with Pioneer 2172 for several traits (scored on a 1-9 basis unless a unit of measurement is given). Data collected from Pioneer yield plots during 1984-87 at various locations in the Southern Great Plains.

<u>Trait</u>	<u>2180</u>	<u>Pioneer 2172</u>	<u>Sig. Diff. at .05 level</u>	<u>No. of Reps</u>
Juvenile vigor	5.5	5.1	*	54
Heading date(after 4/1)	25.0	27.0	*	95
Straw Lodging	7.4	4.5	*	51
Stripe rust resistance	4.1	1.5	*	8
Stem rust resistance	5.3	7.5	*	11

## 14D. Exhibit G. Quality Characteristics of XW161.

From Pioneer yield test plots at 9 locations in the Southern Great Plains during 1985 and 1986.

<u>Variety</u>	<u>% Flour</u>	<u>% Flour</u>	<u>Mixograph</u>		<u>Microbake (10g)</u>
	<u>Yield</u>	<u>Protein</u>	<u>MX Time</u>	<u>Tolerance</u>	<u>Loaf Volume (cc)</u>
2180	68.2	12.2	3.1	2.5	61.7
Pioneer 2172	68.2	11.4	2.9	2.8	59.7
Pioneer 2157	71.2	12.7	3.2	2.7	66.1
TAM 105	67.6	11.4	3.3	3.3	64.7
VONA	67.6	11.5	3.2	4.4	62.1

14E. Exhibit H, Statement of the Basis of Applicant's Ownership.

Pioneer Hi-Bred International, Inc., Plant Breeding Division, believes it is the sole, original and first breeder of the 2180 variety of hard red winter wheat for which it solicits a certification of protection.